Attorney Docket No. YOR920000048US1

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Patent Application

Applicant(s): P.T. Keyser et al.
Docket No.: YOR920000048US1
Serial No.: 09/624,963
Filing Date: July 25, 2000
Group: 2178
Examiner: Londra C. Burge

Title: Methods and Apparatus for Automatic Page Break Detection

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TRANSMITTAL OF APPEAL BRIEF

Mail Stop Appeal Brief - Patents
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

Submitted herewith are the following documents relating to the above-identified patent application:

(1) Appeal Brief in triplicate (original and two copies); and
(2) Copy of Notice of Appeal, filed on July 6, 2004, with copy of stamped return postcard indicating receipt of Notice by PTO on July 9, 2004.

Please extend the period for response by one month to October 9, 2004. Please charge **International Business Machines Corporation Deposit Account No. 50-0510** the amount of $450 ($340 to cover this submission under 37 CFR §1.17(c) and $110 to cover the one month extension fee). In the event of non-payment or improper payment of a required fee, the Commissioner is authorized to charge or to credit **Deposit Account No. 50-0510** as required to correct the error. A duplicate copy of this letter and two copies of the Appeal Brief are enclosed.

Respectfully submitted,

William E. Lewis

Date: October 12, 2004

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APPEAL BRIEF

Assistant Commissioner for Patents
Washington, D.C. 20231

Sir:

Applicants (hereinafter referred to as "Appellants") hereby appeal the final rejection of claims 1-4, 11, 19 and 23-25 of the above-identified application.

REAL PARTY IN INTEREST

The present application is assigned to International Business Machines Corporation, as evidenced by an assignment recorded July 25, 2000 in the U.S. Patent and Trademark Office at Reel 11004, Frame 464. The assignee, International Business Machines Corporation, is the real party in interest.

RELATED APPEALS AND INTERFERENCES

There are no known related appeals and interferences.

STATUS OF CLAIMS

Claims 1-4, 11, 19 and 23-25 stand finally rejected under 35 U.S.C. §103(a). Claims 1-4, 11, 19 and 23-25 are appealed.

STATUS OF AMENDMENTS

There has been no amendment filed subsequent to the final rejection. However, a Response to Final Office Action was filed on July 6, 2004, along with the Notice of Appeal.

SUMMARY OF INVENTION

The present invention provides automated techniques for assigning electronic ink to electronic pages in a handwriting system (by way of example only, a personal digital notepad or PDN) such that the correspondence between the electronic ink and the electronic pages matches the correspondence between the physical ink and the physical page, as closely as possible. The methodologies may use the location and/or time information associated with the handwritten data to detect the number and location of page breaks in handwritten data. Other criteria may be used to perform such detection, e.g., constrained regions, field alignment, degree of ink overlap, neural networks, etc. The method may apply to accidentally omitted page change events and, in certain cases, to accidentally added page change events (Specification, page 2, lines 15-25).

Typically, writers fill out a page from top to bottom; when they finish a page and start writing on the next page, the vertical position of their ink makes a large jump from the bottom of a page to the top. Thus, for typical writing, detecting this abrupt change in position should be sufficient to detect page breaks; however, this picture is rendered more complex in at least three ways. First, writers may make corrections as they write, leading to possibly large jumps in the vertical position of their ink, which do not correspond to page breaks. Second, writers are not constrained to begin new pages at the top of the page and therefore may start a new page by writing at the bottom of the page (e.g., a page number). Third, writers are not constrained to write in a top-down fashion (e.g., a writer fills the top third of a page, leaves a blank area in the middle of the page, writes in the bottom third, and then fills in the medial blank space, after which they also fail to signal a page forward/backward event) (Specification, page 2, line 26, through page 3, line 10).

To overcome, or at least reduce, problems associated with such user actions, in one broad aspect of the invention, a method of processing an electronic document generated in accordance with a handwriting system comprises the steps of: obtaining electronic ink data from the handwriting system, the ink data being associated with the electronic document; and automatically identifying,

using at least a portion of the electronic ink data, one or more potential page breaks for possible insertion in the electronic document to maintain a page correspondence between the electronic document and a physical document also generated in accordance with the handwriting system (Specification, page 3, lines 11-18).

In a more specific aspect of the present invention, page breaks may be identified in the following manner. A set of ink data and a document description are processed by a variety of scoring methods, each of which generates a score for each possible insertion point in the ink. These scores are combined to produce a ranked list of hypothesized page breaks for the corresponding ink data. This ranked list is then used either to insert page breaks automatically using a predefined threshold to determine a cut-off in the list; or to present, on-line, to a human for verification/approval; or a mixture of the two based on two thresholds: one for automatic insertion and the other for human verification. It is to be understood not all scoring methods need be used, that is, one or more of the scoring methods may be used as needed (Specification, page 3, lines 19-28).

By way of example, FIG. 1 depicts a block diagram of an illustrative system in which automatic page break detection methodologies of the present invention may be employed, while FIG. 2 depicts a flow diagram illustrating an overview of insertion point list generation according to one embodiment of the present invention (Specification, page 7, line 18, through page 10, line 25). FIGs. 3 through 14 depict various insertion point scoring methods according to various embodiments of the present invention (Specification, page 11, line 1, through page 18, line 16).

ISSUES PRESENTED FOR REVIEW

(I) Whether claims 1-4 , 24 and 25 are unpatentable under 35 U.S.C. §103(a) over U.S. Patent No. 6,128,633 to Michelman et al. (hereinafter "Michelman") in view of U.S. Patent No. 5,838,819 to Ruedisueli et al. (hereinafter "Ruedisueli);

(II) Whether claim 11 is unpatentable under 35 U.S.C. §103(a) over Michelman in view of Ruedisueli and further in view of U.S. Patent No. 6,502,114 to Forcier (hereinafter "Forcier") and U.S. Patent No. 5,911,146 to Johari et al. (hereinafter "Johari");

(III) Whether claim 19 is unpatentable under 35 U.S.C. 103(a) over Michelman in view of Ruedisueli and in further view of U.S. Patent No. 5,805,118 to Mishra et al. (hereinafter "Mishra"); and

(IV) Whether claim 23 is unpatentable under 35 U.S.C. 103(a) over Michelman in view of Ruedisueli, Forcier and Johari and in further view of U.S. Patent No. 5,909,221 to Nakai et al. (hereinafter "Nakai").

GROUPING OF CLAIMS

Claims 1-4, 11, 19 and 23-25 do not stand or fall together. Claims 1-4, 24 and 25 stand or fall together. Claim 11 stands or falls alone. Claim 19 stands or falls alone. Claim 23 stands or falls alone.

ARGUMENT

Appellants incorporate by reference herein the disclosure of all previous responses filed in the present application, namely, responses dated January 12, 2004 and July 6, 2004.

Regarding issue (I) with respect to the §103(a) rejection of claims 1-4, 24 and 25, Appellants again respectfully assert, as first set out in their previous response dated January 12, 2004, that the Michelman/Ruedisueli combination fails to establish a proper case of obviousness under 35 U.S.C. §103(a), as specified in M.P.E.P. §2143.

To reiterate, as set forth in M.P.E.P. §2143, three requirements must be met to establish a proper case of obviousness. First, there must be some suggestion or motivation to combine reference teachings. Second, there must be a reasonable expectation of success. Third, the cited combination must teach or suggest all the claim limitations. While it is sufficient to show that a proper case of obviousness has not been established by showing that one of the requirements has not been met, Appellants respectfully believe that none of the requirements have been met.

First, there is a clear lack of motivation to combine the references. For at least this reason, a proper case of obviousness has not been established. Michelman is directed to a method of manipulating page breaks in documents created in accordance with standard word processing and spreadsheet applications such as Microsoft Word and Excel (see columns 1 and 2 of Michelman),

while Ruedisueli is directed to a method of processing electronic copies of handwritten notes. That is, the teachings in each reference are directed to completely different environments; one (Michelman) toward standard word processing and spreadsheet applications, the other (Ruedisueli) toward a handwritten note processing environment. Thus, while Ruedisueli is related to a handwriting system, Michelman has nothing to do with a handwriting system. However, other than a very general and conclusory statement in the Office Action, there is nothing in the two references that reasonably suggests why one would actually combine the teachings of these two references.

The Federal Circuit has stated that when patentability turns on the question of obviousness, the obviousness determination "must be based on objective evidence of record" and that "this precedent has been reinforced in myriad decisions, and cannot be dispensed with." In re Lee, 277 F.3d 1338, 1343 (Fed. Cir. 2002). Moreover, the Federal Circuit has stated that "conclusory statements" by an examiner fail to adequately address the factual question of motivation, which is material to patentability and cannot be resolved "on subjective belief and unknown authority." Id. at 1343-1344.

In the final Office Action at page 3, the Examiner provides the following restatement (i.e., changed from the previous non-final Office Action) to prove motivation to combine Michelman and Ruedisueli, with emphasis supplied: "[i]t would have been obvious to one of ordinary skill at the time of the invention to apply Ruedisueli to Michelman, providing Michelman the benefit of adding [an] electronic notepad as taught by Ruedisueli . . . to the automatic page break pagination . . . ."

Despite the elaboration added by the Examiner in the final Office Action, Appellants submit that this statement is still based on the type of "subjective belief and unknown authority" that the Federal Circuit has indicated provides insufficient support for an obviousness rejection. More specifically, other than citing disparate portions of each of the references, the Examiner fails to identify any objective evidence of record which supports the proposed combination. That is, there is no objective support given for why one would be motivated to modify techniques (Michelman) that have nothing to do with a handwriting system to include techniques associated with a handwriting system (Ruedisueli).

Second, Appellants reassert that there is no reasonable expectation of success in achieving the present invention through a combination of Michelman and Ruedisueli. For at least this reason,

a proper case of obviousness has not been established. Despite the assertion in the final Office Action, Appellants do not believe that Michelman and Ruedisueli are combinable since it is not clear how one would combine them. That is, how would one implement techniques relating to a handwriting system in a system that does not process handwriting. There was no guidance provided in the previous Office Action, and there is no guidance given in the final Office Action. However, even if combined, for the sake of argument, they would not achieve the techniques of the claimed invention.

Third, Appellants reassert that even if combined, the Michelman/ Ruedisueli combination fails to teach or suggest all of the limitations of the claims. For at least this reason, a proper case of obviousness has not been established.

For example, as asserted in Appellants' previous response dated January 12, 2004, the Michelman/Ruedisueli combination fails to teach or suggest "automatically identifying, using at least a portion of the electronic ink data, one or more potential page breaks for possible insertion in the electronic document to maintain a page correspondence between the electronic document and a physical document also generated in accordance with the handwriting system, and so as to at least partially reduce asynchrony between an electronic page and a physical page," as in the claimed invention.

For example, as the present specification explains, at page 1, line 15, through page 2, line 2:

> [In accordance with existing techniques,] . . . to maintain . . . accurate correspondence between the physical page and the electronic copy, the writer is required to "turn" the electronic page when changing to a new or previous paper page by pressing the corresponding page-forward or page-backward button on the PDN [personal digital notepad]. These buttons effect synchrony between the physical and electronic page by recording these events in the data stream. Asynchrony between the paper and electronic pages occurs when a writer forgets to press the appropriate button on the device or accidentally presses the button too many times. Subsequent writing is then electronically recorded on the wrong electronic page, and the new electronic ink is recorded on top of the page's original electronic ink. This problem may be compounded since the user may flip forward or backward by several pages at a time and may do so several times within a single document. Later, when the resultant electronic page is viewed, the merged original and overwritten electronic ink can be confusing and may be difficult to read and correct.

To address this problem, the claimed invention automatically identifies, using at least a portion of the electronic ink data, one or more potential page breaks for possible insertion in the electronic document to maintain a page correspondence between the electronic document and a physical document also generated in accordance with the handwriting system, and so as to at least partially reduce asynchrony between an electronic page and a physical page.

A key aspect with respect to the claimed invention is that the potential page breaks are automatically identified. So, even if a writer forgets to press the appropriate button on the device or accidentally presses the button too many times, causing asynchrony between the paper and electronic pages, the claimed invention automatically identifies, using at least a portion of the electronic ink data, one or more potential page breaks for possible insertion in the electronic document to maintain a page correspondence between the electronic document and a physical document also generated in accordance with the handwriting system, and so as to at least partially reduce asynchrony between an electronic page and a physical page.

Michelman has nothing to do with handwriting systems and, therefore, does not address the unique electronic/physical page asynchrony problem associated with handwriting systems. However, while Ruedisueli relates to handwriting systems, it does not address the problem that the claimed invention addresses. That is, while Ruedisueli explains that page identifiers (36) are manually entered in the upper right hand corner of a page to set the page number (column 4, lines 46-56 of Ruedisueli) and to change the page number (column 5, lines 26-40 of Ruedisueli), there is no teaching of automatically identifying, using at least a portion of the electronic ink data, one or more potential page breaks for possible insertion in the electronic document to maintain a page correspondence between the electronic document and a physical document also generated in accordance with the handwriting system, and so as to at least partially reduce asynchrony between an electronic page and a physical page, as in the claimed invention.

Thus, while Ruedisueli illustrates a user signaling a page change, the problem is that this manual signaling could be wrong, or the user could just forget to manually signal a page change, resulting in the above-described asynchrony problem. Ruedisueli provides no solutions for this problem. Also, while Michelman mentions allowing a user to select a page break via a graphical user interface and then adjusting the page breaks for the remainder of a document, again, the initial

selection is still a manual process, not an automated process. Thus, the cited combination fails to teach or suggest the automated identification operation of the claimed invention.

It appears that the final Office Action still fails to address this claim limitation.

For at least these reasons, it is asserted that independent claims 1-4, 24 and 25 are patentable over Michelman and Ruedisueli.

Regarding issues (II), (III) and (IV) and the §103(a) rejection of the various dependent claims, Appellants respectfully assert that the various combinations, based on Michelman/Ruedisueli that also include one or more of Forcier, Johari, Nakai and Mishra, also fail to establish proper cases of obviousness under 35 U.S.C. §103(a), as specified in M.P.E.P. §2143. Such dependent claims are patentable over the cited combinations not only due to their dependence on the above-mentioned independent claims but also because such claims recite patentable subject matter in their own right.

For example, dependent claim 11 recites the step of determining a confidence measure for the potential page break associated with the possible insertion point. However, the rejection relies on Johari which relates to a commercial telephone directory. It is believed that Johari is not properly combinable with Michelman and Ruedisueli since there is no clear support for how or why one would combine such disparate references. Even if combinable, for the sake of argument, the advertisement stream page break is not the same as the claimed feature. Furthermore, the final Office Action makes no mention of Forcier in its' rejection rationale.

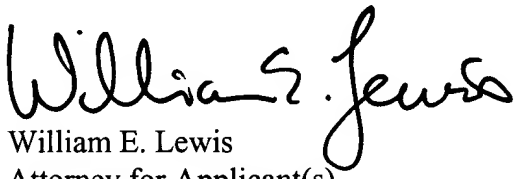
Further, by way of example, dependent claim 19 recites the step of automatically identifying one or more potential page breaks by utilizing a learning algorithm. However, the rejection relies on Mishra which relates to a display protocol specification with session configuration and multiple monitors. It is believed that Mishra is not properly combinable with Micheleman and Ruedisueli since there is no clear support for how or why one would combine such disparate references. Even if combinable, for the sake of argument, just because Mishra mentions a learning algorithm does not mean Mishra discloses the claimed feature.

Still further, by way of example, dependent claim 23 recites the step of identifying a potential page break as a point offset from a possible insertion point determined in accordance with a scoring procedure. However, the rejection relies on Johari which relates to a commercial telephone directory. Again, it is believed that Johari is not properly combinable with Micheleman and

Ruedisueli since there is no clear support for how or why one would combine such disparate references. Even if combinable, for the sake of argument, any score disclosed in Johari is not the same as the claimed feature. Furthermore, the final Office Action makes no mention of Forcier or Nakai in its' rejection rationale.

In view of the above, Appellants believe that claims 1-25 are in condition for allowance, and respectfully request withdrawal of the §103(a) rejections.

Respectfully submitted,



Date: October 12, 2004

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APPENDIX

1. A computer-based method of processing an electronic document generated in accordance with a handwriting system, the method comprising the steps of:

obtaining electronic ink data from the handwriting system, the ink data being associated with the electronic document; and

automatically identifying, using at least a portion of the electronic ink data, one or more potential page breaks for possible insertion in the electronic document to maintain a page correspondence between the electronic document and a physical document also generated in accordance with the handwriting system, and so as to at least partially reduce asynchrony between an electronic page and a physical page.

2. The method of claim 1, wherein the handwriting system is a personal digital notepad.

3. The method of claim 1, further comprising the step of automatically inserting the one or more identified potential page breaks in the electronic document.

4. The method of claim 1, further comprising the step of presenting the one or more identified potential page breaks to a user for approval to automatically insert the one or more identified potential page breaks in the electronic document.

5. The method of claim 1, wherein the step of automatically identifying one or more potential page breaks further comprises the steps of:

measuring a spatial difference between consecutive pairs of strokes made in accordance with the handwriting system; and

labeling spatial differences not below a threshold value as possible insertion points.

6. The method of claim 5, further comprising the steps of:

for each spatial difference not below the threshold value, computing one of the number of strokes and the total arc length associated with strokes that occur between the current possible

insertion point and one of the next page breaks in the electronic document and the end of the stroke set of the document; and

assigning one of the number of strokes and the total arc length as a score to be associated with the possible insertion point.

7. The method of claim 6, wherein the assigning step is performed when one of the number of strokes and the total arc length is not below a second threshold value.

8. The method of claim 1, wherein the step of automatically identifying one or more potential page breaks further comprises the steps of:

measuring a temporal difference between consecutive pairs of strokes made in accordance with the handwriting system; and

labeling temporal differences not below a threshold value as possible insertion points.

9. The method of claim 8, further comprising the step of, for each temporal difference not below the threshold value, assigning a score to the corresponding possible insertion point based on a distance from the temporal difference to the threshold value.

10. The method of claim 1, wherein the step of automatically identifying one or more potential page breaks further comprises the step of identifying as a possible insertion point a point before a stroke, made in accordance with the handwriting system, wherein the stroke falls within a constrained region on a page associated with the document and wherein the stroke is not immediately preceded by another stroke in the same constrained region.

11. The method of claim 1, further comprising the step of determining a confidence measure for the potential page break associated with the possible insertion point.

12. The method of claim 1, wherein, in an electronic document that corresponds to a form with fields, the step of automatically identifying one or more potential page breaks further comprises the steps of:

computing a measure of field appropriateness for each stroke made in accordance with the handwriting system to indicate how well a stroke fits within a particular field; and

for N consecutive strokes which do not fit the field of a particular page of the document, identifying a potential page break before these N consecutive strokes.

13. The method of claim 12, wherein the potential page break indicates the page number of the page having a field with which the N consecutive strokes appropriately fit.

14. The method of claim 1, wherein the step of automatically identifying one or more potential page breaks further comprises the steps of:

computing a measure of overlap for each stroke with a previous stroke; and

for N consecutive strokes with a total measure of overlap which is not less than a threshold value, identifying a potential page break before these N consecutive strokes.

15. The method of claim 1, wherein the step of automatically identifying one or more potential page breaks further comprises the steps of:

computing a moving average of spatial positions of strokes, made in accordance with the handwriting system, on a page using a predetermined window width, the computation of the moving average resulting in a spatial position moving average curve;

computing a moving average of a slope associated with the spatial position moving average curve, the computation of the moving average resulting in a slope moving average curve; and

identifying one or more negative slopes in the slope moving average curve as potential page breaks.

16. The method of claim 15, wherein negative slopes are identified as potential page breaks based on peak-heights.

17. The method of claim 1, wherein the step of automatically identifying one or more potential page breaks further comprises the steps of:

computing a moving average of temporal positions of strokes, made in accordance with the handwriting system, on a page using a predetermined window width, the computation of the moving average resulting in a temporal position moving average curve;

computing a moving average of a slope associated with the temporal position moving average curve, the computation of the moving average resulting in a slope moving average curve; and

identifying one or more positive slopes in the slope moving average curve as potential page breaks.

18. The method of claim 16, wherein positive slopes are identified as potential page breaks based on peak-heights.

19. The method of claim 1, wherein the step of automatically identifying one or more potential page breaks further comprises the steps of utilizing a learning algorithm.

20. The method of claim 1, wherein the step of automatically identifying one or more potential page breaks further comprises the steps of:

performing two or more scoring procedures, each scoring procedure generating a list whose elements include a possible insertion point and a corresponding score;

merging the lists generated by the two or more scoring procedures to form a combined list; and

selecting one or more top scoring possible insertion points as the one or more potential page breaks.

21. The method of claim 20, wherein the selecting step further comprises selecting a number of top scoring possible insertion points to match the number of expected pages of the document.

22. The method of claim 20, wherein the merging step further comprises merging the lists by one of (i) accepting all possible insertion points except duplicates; (ii) unbiased voting; (iii) biased voting; (iv) using disjunctive normal forms; and (v) using neural networks.

23. The method of claim 1, wherein the step of automatically identifying one or more potential page breaks further comprises the step of identifying a potential page break as a point offset from a possible insertion point determined in accordance with a scoring procedure.

24. Apparatus for processing an electronic document generated in accordance with a handwriting system, the apparatus comprising:

at least one processor operative to: (i) obtain electronic ink data from the handwriting system, the ink data being associated with the electronic document; and (ii) automatically identify, using at least a portion of the electronic ink data, one or more potential page breaks for possible insertion in the electronic document to maintain a page correspondence between the electronic document and a physical document also generated in accordance with the handwriting system, and so as to at least partially reduce asynchrony between an electronic page and a physical page; and

a memory, coupled to the at least one processor, which stores the electronic ink data associated with the electronic document.

25. An article of manufacture for processing an electronic document generated in accordance with a handwriting system, comprising a machine readable medium containing one or more programs which when executed implement the steps of:

obtaining electronic ink data from the handwriting system, the ink data being associated with the electronic document; and

automatically identifying, using at least a portion of the electronic ink data, one or more potential page breaks for possible insertion in the electronic document to maintain a page correspondence between the electronic document and a physical document also generated in accordance with the handwriting system, and so as to at least partially reduce asynchrony between an electronic page and a physical page.